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ABSTRACT

This booklet provides information on corn and hog farming on a small farm through a profile of a farm family. According to the profile, John and Mary Miller and their three children are a comfortable family operating a corn and hog farm in Iowa. John, the principal farmer, uses a variety of skills in management, veterinary science, soil science, agriculture, computers, business, and science as he goes about his tasks of breeding and raising hogs and raising corn for their feed. Mary, his wife, leads a typical suburban life, driving the children to school functions, teaching piano lessons, being available for farm errands, preparing meals, and doing housework. The children are engaged in school activities and planning to further their education. The booklet uses a description of the typical daily activities of this family to provide information on the work skills, lifestyle, income, and values needed by persons who are successful in such a career. The booklet is illustrated with photographs of the Millers at work and recreation on their farm. (KC)

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PEOPLE ON THE FARM:
CORN AND HOG FARMING

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PEOPLE ON THE FARM:

CORN AND HOG FARMING

He's the manager of a substantial and successful farm business, but John R. Miller of Cedar Falls, Iowa was shoveling manure when his teenage daughter stopped by the hog farrowing building. She needed more feed for her riding horse, Val, and asked Dad to order some.

John smiled, wrote a reminder in his ever-present notebook, and returned to cleaning the farrowing house—a kind of delivery room and nursery for newborn pigs.

In a few moments this manager-father-laborer took on the additional role of businessman, phoning into town for the latest prices on mixed feed (which he would be buying) and on corn (which he would be selling).

But he is more than a manager, a father, a laborer and a businessman.

Some days he injects medicine into his hogs—as a veterinarian would—to fight disease.

On other days he is repairing a gate or widening the entrance to a machinery shed (for his bigger, new farm implements), or performing his own carpentry.

So John Miller is not only a manager, a father, a laborer, and a businessman; but he is, among other things, also a para-veterinarian (if there is such a word), a carpenter and a repairman—nearly all because he is a farmer growing hogs and corn on the gently rolling lands of Iowa.

Above all, perhaps, John Miller is a conservationist who conscientiously works with the soil so that it will provide for his family this year and next, and will also remain productive for limitless years and unknown "owners" into the future.

Like most farmers, John Miller is busy changing caps; and like most farmers, he feels he is in danger of being stereotyped.

John would like to dispel at least one possible misconception about farmers, in the beginning of this, his story. All farmers are not automatically early risers, John insists. Hog and corn farmers—unlike dairy farmers—just don't have to get up early every morning, he'll tell you.

"I'd rather work into the night—say until 10 o'clock—than get up early in the morning," he says.

But he isn't as convincing as he might be.

Many mornings you'll find the 38-year-old farmer in his kitchen by 6:15, eating breakfast he has prepared himself, and listening to farm market prices on the radio.

"I wouldn't want to be in bed if someone comes by," he said, almost apologetically.

Even when the family took a week's vacation, his wife Mary said, John woke up every morning at 5:30. Yes, this modern farmer and his family are able to get away on vacations from time to time, leaving affairs in the hands of capable part-time helpers.

MILLERS ENJOY FARM LIFE

Farming, to John and Mary, is a business which enables them to maintain a good standard of living.

They live in a century-old, modernized, and air-conditioned home nestled among big old ash trees and pines in wide open countryside. It is just 12 miles from the center of a metropolitan area containing 133,000 persons, Waterloo-Cedar Falls, Iowa.

Like many of today's farmers, the Millers belong to a church and other organizations in which few of the members are farmers. Mary, also 38, belongs to a study club in which she is the only member who lives on a farm.

Quiet, graceful, quick to smile and intelligent, Mary is an articulate and charming spokeswoman for the agricultural way of life. She and John address community groups on the needs and trends of modern agriculture. Their farm was the location for taping of television's Today Show when the show visited Iowa in October 1975.

Their children, Julie, 15, Brad, 13, and Brian, 12, are active in school—Julie in a jazz band and other musical outlets, the boys in music and sports.

Mary sees herself as a suburban housewife. Yesterday, an ordinary day, she and John made three trips into the nearby community of Hudson because of the children's activities.

Their wide circle of friends includes people in work other than agriculture. Today, as she prepared a breakfast of sausage, eggs, and toast in her modern kitchen, Mary explained:

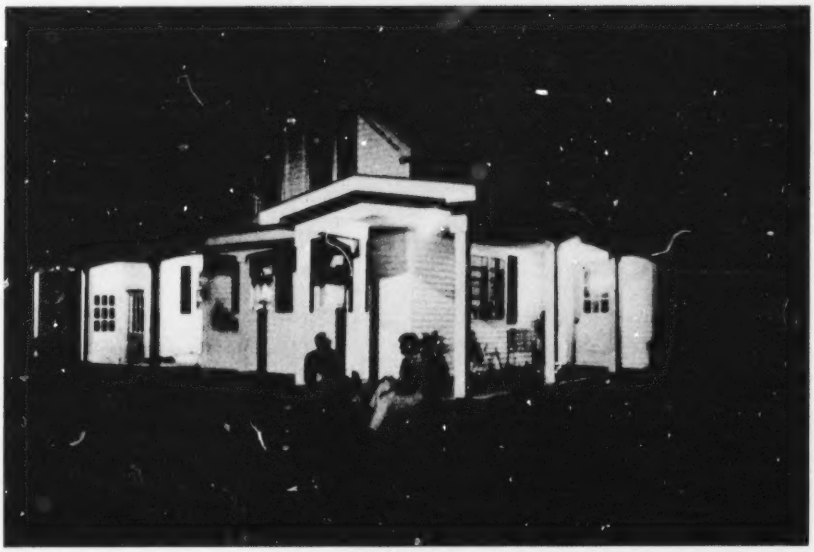
"Really, we have the best of two worlds. We can live in the countryside and still be close to cultural events. We live within a 2-hour drive of the University of Iowa, which is well known for its excellence in the arts. We're not far from Iowa State University in Ames, where the New York Philharmonic performed recently. We often travel 10 miles to the University of Northern Iowa to attend concerts, plays and so on."

The Millers always hold season tickets to the Waterloo-Cedar Falls Symphony series.

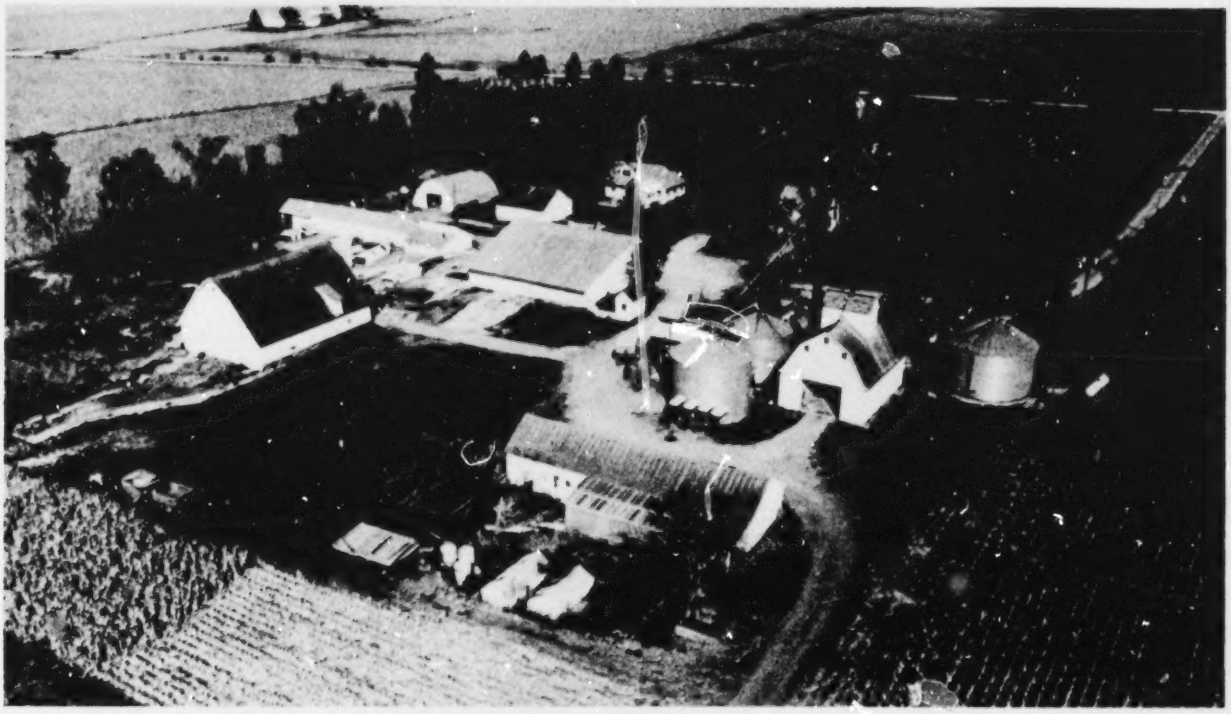
Mary teaches piano to 21 students in her home. She doesn't get involved in any of the field work on the farm, though she is always on call to make runs into town for equipment repairs and parts. The children help a lot with the farm work, but

High schooler Julie Miller stops at entrance to the farrowing house to tell her dad that her riding horse needs more feed from town.

Left:
Like a running back cradling a pigskin, John Miller steps out of the finishing barn with a hog that seems reluctant to have his blood tested so that John might learn whether he's feeding his animals correctly.



Just a dozen miles from the center of the Waterloo, Iowa metropolitan area, John and Mary Miller nonetheless live in the country. If they aren't attending a concert or delivering children to activities in town, they might take time for a chat on the porch of their modernized century-old farm house.



The nerve center of John and Mary Miller's farm is like an island in a sea of grain. This is where hogs are bred, born (left center of the farmsite) and fed for market (in big barn at left). It's where thousands of bushels of corn are dried and stored (cylindrical grain bins at right) and where the many machines of farming are protected from weather (lower right and center buildings). It's also where the family lives (in home almost hidden by pipes that handle flow of grain between bins) and where John and Mary lived when they first moved back to the farm (smaller home at center, top of farmsite). Miller children walk down lane at right to meet school bus. Wagons at edge of corn (left center) will be filled with grain from harvester and driven to dryer and storage in bins.

their parents would take on a chore for them rather than keep the youngsters from participating in some rewarding event in town.

"We are interested in our children having a broad, balanced education," Mary explained. "Shoveling manure at the expense of an educational experience doesn't really broaden one's background or help him to understand the world around him."

"Mary and I are willing to work an extra hour or two a day so they can play basketball or something," John said as he left breakfast to begin the day's work with a trip to the farrowing house. "When we get tired, however, we figure they're not doing enough."

So farming for the Millers is a business which provides the family with a lifestyle they enjoy.

Farming is definitely a business. Later, when he checked his books in an office near the kitchen, John reported that the farming operation netted them about $15,000 cash in 1975, from a total gross income of $178,496.

He considers it a 1½-man operation. In 1975, he hired a college student to work weekends and part-time during the week. A neighbor drops by occasionally to help out in the evening.

Growing hogs, and the corn to feed them, is the main objective in the Miller operation—within, of course, the overall objective of making a profit.

Corn grows so well in Iowa, Illinois and six neighboring States in the East-Central United States that the area is called the Corn Belt. And where corn grows well, so do hogs.

Corn and hogs go together like hand and glove, since corn makes up the main feed for hogs. The price relationship of hogs to corn, called the hog-corn price ratio, has a seesaw effect and determines how much money John Miller makes at any particular time.

WHAT'S THE HOG-CORN PRICE RATIO?

The hog-corn price ratio is the number of bushels of corn that you can buy with the price of 100

pounds of live hogs.

The ratio provides farmers—and others—with a rough idea of whether it is more profitable to sell their corn directly for cash or to sell it through the feeding of hogs.

When 100 pounds of live hog will buy 18 bushels of corn, the hog-corn price ratio is said to be 18. Generally, it is more profitable to feed hogs when the ratio is higher than 18.

The hog-corn price ratio only points in the general direction of profitability. For instance, the hog-corn price ratio in Iowa in January 1975 was 12.6. Iowa State University estimated that hog farmers made a profit of only 95 cents a head on hogs they sold that month. By October that year, the ratio had climbed to 22.5; and hog farmers, the university estimated, made a profit of $62.67 per animal.

A year earlier, the hog-corn price ratio in Iowa had dropped to 10.8 in May. Hog farmers were *losing* $14.66 per animal. So, many cut back on hog production.

But there's another way to look at it. Pausing in his early morning check of conditions among the sows and their newly-born pigs, John explained: "Our hog program is aimed at consistent production year after year. If you try to outguess the hog cycle (national ups and downs in prices and production), and raise hogs only in profitable years, you end up being 'out' when you should be 'in' or 'in' when you should be 'out.'

"We hope that the highs and lows will average out if we stay in the hog business consistently."

The hog-corn price ratio isn't the whole story on growing hogs and corn. There are other considerations.

John Miller, whose mind seems constantly at work, likes being his own boss.

"In a corporation," he mused, "You have to work your way up to decision-making over a period of years. Here I have been making all my own decisions from the moment I went on my own."

It's obvious that he thrives on it.

John manages a farm production plant estimated to be worth $886,800.

The land and buildings are valued at $780,800. John owns 160 acres, rents another 258 acres from a trust that benefits his mother, and custom farms another 70 acres for a neighbor.

His machinery—depreciated—has an estimated value of $85,000 (he could sell it for much more); and livestock $21,000.

Long-term decisions can make John pause: "You sign a piece of paper and suddenly you're $100,000 in debt."

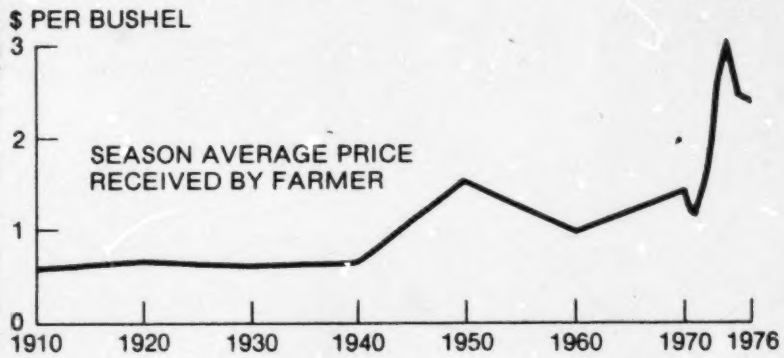
Short-term decisions, more common, are taken in stride. Some may have significant consequences.

"I've had the price of soybeans change 10 cents a bushel just while I was on the phone," John recalled as he folded and stacked empty feed bags for another use. "It's no place to be if you've got a nervous stomach."

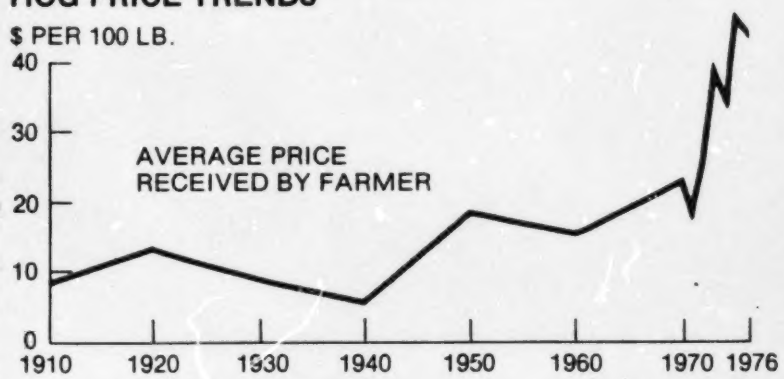
All of John's skills, from manager to laborer are employed continually in response to a stream of large and small demands.

Take farrowing time, for example, when the sows give birth to little pigs.

CORN PRICE TRENDS



HOG PRICE TRENDS



DECISIONS, DECISIONS

John Miller's farm thrives on decisions, large and small. The farm devours decisions like a hog eating corn. John keeps making decisions, but the farm keeps demanding more.

John describes the process in these excerpts from his conversation:

"First thing in the morning there are the decisions about what chores you are going to do that day and in what order. There are things for rainy weather and things for dry weather. You think, 'Gee, I'd like to do that today,' but it's the type of job that should be left for a rainy day and today is dry."

"How much feed do I have left? I've got one bag of a particular premix so I'll have to call and order more. But what's the situation now on soybeans? I'm concerned about the soybean market because I want to know when to book soybean meal. I've already booked a quarter of what I need—that is, I've locked in the price, but I haven't taken delivery. The first crop reports from farther south always give an indication of what the crop will be. The market reacts. Yesterday, soybeans went up 20 cents."

"The other day we had to decide, do we market (hogs) today or not? I had one of those things that are called a headache. I was really feeling lousy. And I knew the stuff that I wanted to get done before you people (the photographer and writer) came. There are a couple of packing companies on strike and that might affect the market. Okay, last night we caught on the television that hogs had gone up 50 cents (per hundred pounds). But I would have had to deliver the hogs by 10 or 11 o'clock when you were here.

"Well, I knew from the week before that my heaviest hogs were just a shade over 2 (hundred pounds) and that with reasonably warm weather and normal gains, they wouldn't be overweight next week, and I wouldn't be docked badly (payments reduced because hogs weighed beyond the packer's ideal limit.) So I decided to market next week."

"We've been looking to expand. I've been looking at buildings, pricing them. I've been pushing a pencil. We found one building that would be finished to the point where I could just walk in and take over—it would run about $24,500. When I did an estimate on the materials only—no labor—I came in at $13,000. If I built it myself—with some college help—how long would it take me?

"We know we're on the way down, pricewise, on the 4-year hog cycle, and that the cost of corn is possibly going to go up, which means the profits are going to go down. If we know the (profit) margins are going down, we may be kidding ourselves building now. On the other hand, if we start building slowly now, we will be set when the market starts back up.

"Sometimes I can be walking from the hog house to the corn crib thinking about this kind of stuff and forget what I went over to the corn crib for."

"You have a choice on slats. You can go concrete. You could go with plastic. You could go with wood. Each one has an advantage and a disadvantage. These happen to be 6-inch-wide wood slats. The advantage at the time I installed them—in a real tough cash flow situation—was that I could put these in at 19 cents a square foot, and concrete would cost me something like $2.50. So it didn't take anyone with higher math to figure out which way to go."

Keeping in close touch with potential buyers of his corn, John Miller uses telephone in his home office frequently to learn local elevator prices. He also checks radio reports for regional and national prices. He generally doesn't call for hog prices, preferring to deliver them regularly throughout the year.

BEST COPY AVAILABLE

A dose of antibiotics to prevent internal infection is one of the earliest experiences in a pig's life. There will be others, such as having its tail and sharp teeth cut off.

FARROWING TIME IS BUSY

If there is a time when John needs to be up early, it is when the sows are farrowing and before all the pigs are weaned.

Though each sow is in the farrowing house only 4 weeks, it takes 6 weeks for all of the impregnated sows tc farrow and their pigs to be weaned. These farrowing periods happen four times a year on the Miller farm, though individual sows farrow only twice a year. When the pigs are weaned, they are taken from their mother's milk—going "cold turkey," as John put it.

"Many's the Sunday morning, even Christmas, that I've spent working in the farrowing house," John said, nodding toward the row of metal stalls in which the sows were nursing their squirming pink offspring. "I used to have seven farrowings a year on the farm, but that was driving me up the wall."

Farrowing causes so much work and calls for so much extra care that John adjusts the farm schedule so that the pigs are born when they won't compete for time with the field work necessary to grow corn.

John Miller's sows farrow in mid-June (after corn planting), in late August (before harvesting the corn), mid-December (after harvest and fall plowing of the soil for next year's crop), and in early March (before planting).

Pigs are born after a sow has been pregnant for just under 4 months (this gestation period, as it is called, lasts about 113 days). There may be no pigs born alive or there may be as many as 16 in a litter. The average is about 8 or 9.

The danger of losing newborn pigs to disease and other difficulties is high. On a national average, 25 to 30 percent never reach weaning age.

The highest percentage of deaths take place within 3 or 4 days of birth.

From a financial point of view, such deaths are costly. It may cost a farmer $382 a year to keep a sow—and that wouldn't be unusual. If the sow saved 10 pigs a year (5 per litter), the cost per pig would be $38.20. However, if she saved 16 a year (8 per litter), the cost per pig would be $23.88.

With that in mind, John wants to take very good care of the young pigs. He puts his son Brad in charge of them. Brad is paid on the basis of an eight-pig litter. But he gets paid a little more if

the litter is larger, so Brad does his best to keep the young pigs alive and well.

Soon after each pig is born, Brad squirts a dose of antibiotics down its throat to prevent internal infection. He applies a tar-like salve to each pig's knees to keep the pigs from picking up an infection while crawling around.

When the pigs reach 1 week, and again when they reach 4 weeks of age, Brad injects them with a combination of iron, antibiotics, and vitamins to prevent anemia and disease.

Part of Brad's work is to clip the tail off each young pig. That dangling pink tail seems to tempt other pigs to bite it, opening a wound that may become infected.

Brad's job also includes using a pair of metal clippers to snip off the sharp upper and lower incisor teeth (eight in all) in the mouth of each pig as soon as possible after birth. Otherwise the young pig would bite a hole in (a) his own mouth, (b) the other pigs in the litter, and (c) his mother—opening wounds that are potential starting places for infection.

Brad helps his dad, too, with shots and inoculations.

Today, after joining his dad in the morning chores, Brad's job is a relatively clean one . . . snipping off tails with a dog's toenail clippers and expertly performing his dental work.

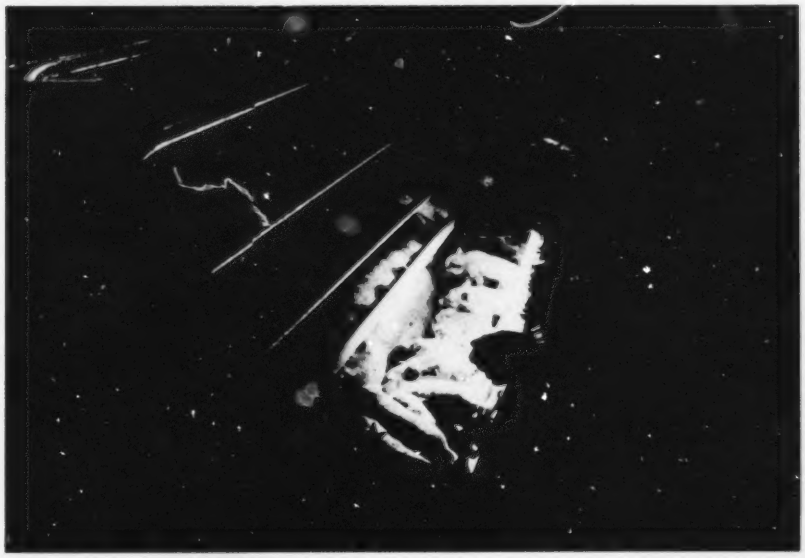
His dad, meanwhile, has been cleaning out the farrowing stalls, removing manure, an occasional dead pig, and afterbirth. He does this each morning and night at farrowing time.

"A lot of people send their kids to clean out the farrowing house," John said, "but I usually don't. The kids could learn to hate hogs that way—and to hate farming.

"Still, they need to learn that all jobs have good and bad points."

So, Brad cleans out the farrowing house about 15 percent of the time.

As John watched, Brad worked his way down the line of 21 farrowing pens, listening to the latest music blaring out of a nearby radio. John said, "Brad's thinking about Minnesota right now." Brad was going on a week's vacation in northern Minnesota the next day.



Pigs don't need a light to find their food but rather to keep them warm in the farrowing house. Most sows lie down slowly enough for pigs to scramble out of the way but iron rails help keep mama off the young ones, too. Hog breeders like sows with enough teats to handle large litters. So do the pigs.

Another early experience for pigs is a visit from the dentist, who in this case is Brad Miller. No fillings, no extractions. Rather, the sharp points of the pigs' teeth are cut off to prevent pigs from wounding each other.

EVERYTHING BUT THE SQUEAL?

Pork is just one hog product. Another is replacement heart valves for humans. Still another is paint brushes made with bristles, the short stiff hair of the hog.

There was a saying once that "They market everything of the hog but the squeal." That's still true. Some of the newest applications of hog parts are fairly sophisticated.

Who would have guessed, for instance, that surgeons at Stanford University Hospital would develop a technique for replacing human heart valves with heart valves from hogs? Perhaps those scientists who have worked with hogs as substitutes for humans in medical tests would have guessed. Or the surgeons who have been using pig intestines for sutures.

Because the cardiovascular and respiratory systems of hogs are similar to humans, and the nutritional needs of hogs and humans are about the same, hogs have served as subjects in experiments on alcoholism at the University of Missouri.

The hog is no stranger to the medical world for other reasons.

Adrenal glands from hogs and other animals provide adrenal cortex extract used to treat Addison's disease, and provide the drug epinephrine, used to treat bronchial asthma and whooping cough.

Pigskin not only is used in the form of gloves, shoes, hats, billfolds, coats, pants suits, vests, and topcoats but also is an aid in the treatment of severe burns.

Hog pancreases provide insulin for the treatment of diabetes.

A list citing the hog's medical usefulness could become quite long.

But what about hogs as food?

Pigskin is a major source of quality gelatin used in desserts, ice cream mixes, and other products.

Pigs' stomachs are a prime source of the enzyme pepsin used in chewing gum.

But most notably, there are: pork chops, ham, bacon, spareribs, sausage, Canadian bacon, Boston butts, lard, picnic hams, pork loin roasts, hog jowls, pigs' feet and chitterlings (chitlins), to mention a few of the more familiar delicacies.

And then there are all those footballs—right? Wrong. Footballs are still called pigskins—but now they're made out of something else.

At farrowing time, division of labor on the Miller farm finds Brad clipping tails and his father cleaning out the farrowing pens. From here, manure and afterbirth are loaded onto a manure spreader for use in the fields. Often dead pigs and afterbirth are buried.

SOME TROUBLES CROP UP

Not everything went smoothly in the farrowing house that morning.

One sow had developed MMA (mastitis-metritis-agalactia), an inflammation that prevents her from producing a normal flow of milk. Only a few pigs in her litter were able to feed from her. John injected her with medicine and tried to encourage the youngsters to eat a special ration designed for such emergencies. But sometimes the young pigs aren't able to adapt. Four or five pigs—or the whole litter—may die.

Another sow had farrowed only two pigs. Calling her "the star boarder" because she didn't produce enough pigs to pay for her keep, John said she was headed for the market after that farrowing, her first. He usually markets sows after two farrowings.

The Millers have two breeding herds of about 25 sows each, and each group farrows twice a year. That provides them with a steady supply of pigs to sell year round. John markets hogs nearly every week of the year. In the early 1970's he sold more than 700 hogs a year. He plans to quadruple that production.

What kind of hogs is John Miller trying to market? Hogs that are 6 months old or less, weigh about 220 pounds, and are lean, lean, *lean* because consumers don't like fat pork.

John sells his hogs to a packing plant (meat processing plant) in town on a "grade and yield" basis. That means his payment per hog depends on how many pounds of usable meat the hog carcass yields in comparison with the total weight of the live hog, and what percentage of its carcass is convertible into good lean hams, chops and other premium pork cuts.

Nowadays, nobody wants a fat hog. Lard, produced from hog fat, isn't so much in demand. Vegetable oils have taken its place in cooking.

Besides, housewives today generally don't like fatty bacon or fatty pork chops or fatty hams. They want lean meat. Consequently, the meatpackers also want lean meat and they pay more for it.

So the farmers grow lean hogs. Not thin, skinny hogs; but wide, heavily muscled hogs.

How do they do that? By scientific feeding and breeding.

THE RATH PACKING COMPANY

WATERLOO IOWA

No. 33239

HOG GRADE AND YIELD VOUCHER

A voucher tells John Miller not only how much his hogs weighed when he marketed them and what he was paid for them, but how meaty they were. Seven of the 10 hogs Miller delivered that day were graded number 1 by company standards, yet the cents he was paid per pound dropped off when the hog weighed more than 230 lb. The tattoo is Miller's identification number. A base market price of $43.50 means Waterloo packers were paying 43½ cents a pound for hogs that day. The .20 under N.L.S. means 2 cents per hog were sent to the National Live Stock and Meat Board to promote the use of pork. The deduction of $900.80 means Miller was paid $900 the day he brought in the hogs and that 80 cents (8¢ per hog) was sent to National and State Pork Producer Councils for pork promotion and research (such deductions are voted on by hog producers). The net value means that's what Miller will be paid in about a week, bringing his total payment for the 10 hogs to $992.95. Figures on bottom line indicate Miller's hogs yielded more lean meat for chops and other top quality cuts than did others marketed that day.

Left above:
Hogs are fed to market weight (about 220 pounds) in a finishing unit, where they are separated into groups of about 20, all weighing about the same.

Right, above:
Soybean meal to be mixed into hog feed is stored in corn crib, which is being re-covered with metal siding. John Miller shows a friend and carpenter, Jerry Geisler, how he wants it done. Atop the ladder is another friend, Kent Brandhorst.

NUTRITIOUS PORK

A serving of 3½ ounces of pork supplies more than 44 percent of the protein that an adult needs daily, also 75-103 percent of the thiamin, 20-30 percent of vitamins B_6, B_{12}, niacin, riboflavin and phosphorous, and 10-35 percent of the iron.

The same size serving of lean pork cuts such as loin chops and cured hams contains fewer than 250 calories.

BEST COPY AVAILABLE

ABOUT FEEDING

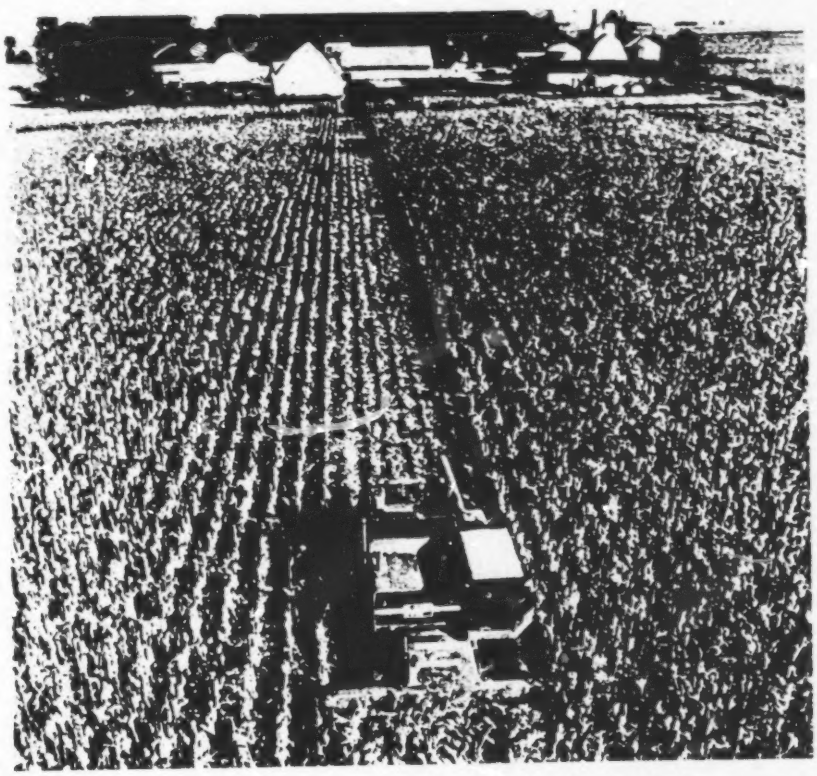
John Miller uses 6 different feed formulations for his hogs.

What do hogs need in the way of feed? Much the same nutrients as humans. Hogs need carbohydrates and fats for heat and energy—and whatever fat is needed for insulation. Protein is vital in the building of muscles, which will become hams, chops and other parts of the hog. Like humans, hogs need minerals, too, as well as vitamins.

Water is essential. So are antibiotics in small amounts, to prevent and control diseases and help increase the animal's rate of growth.

Hog farmers provide these essential nutrients largely through corn, supplemented with a concentrated source of proteins, such as soybean meal. Feeding corn, among the grains, results in the most economical and rapid gains in hogs.

The youngest pigs get a ration of 18 to 20 percent protein. After they weigh 12 pounds, the protein percentage is cut to 16 or 18. The pigs stay on that ration until they weigh 40 pounds, after which the protein percentage is cut gradually from 16 to 12 percent in their feed, where it stays until market time.



Morning silence is broken by the rumble of the $44,000 corn harvester as John Miller begins to cut and shell the 375 acres of corn he planted half a yea: earlier. Metal "fingers" reach out to gather in six rows of stalks at a time. About 12 feet tall, the new red machine lumbers forward, shelling the grain from the cob and spewing dusty husks and cobs out the back. The dry tearing of the corn and rumble of the motor are ignored as the operator's attention is riveted on the metal "fingers" skimming along just 6 inches above the ground, to make certain they don't stab into the ground at an unexpected dip in the land.

NOT ALL CORN IS FED TO ANIMALS

Nearly all of the corn grown in the United States is fed to animals. Yet the rest of it ends up in some interesting places.

Here's what happened to the 1975 corn crop (not including sweet corn), plus what was left over from the previous year.

U.S. farmers planted 78 million acres to corn that year. They harvested 67 million acres for grain. Most of the corn on the rest of the land was cut green to make silage—which is fed to animals.

American farms yielded 5,767,000,000 bushels of shelled corn that year. That's an average yield of 86 bushels per acre—far below the average yield on John Miller's farm.

To this add the 359 million bushels the United States had left over from the previous year and the 2 million bushels we imported (most of this from South America).

This totals slightly more than 6 billion bushels of corn to use.

Of this, we put 3.65 billion bushels into feed (for animals). We shipped another 1.7 billion bushels overseas—and most of this was used to feed livestock. We kept 465 million bushels for human food (again, this does not include sweet corn, canned or fresh), seed, and industrial uses. We had 313 million bushels left over—a little less than we had left over from the previous year.

Let's examine what that "food, seed, and industrial uses" means. Seventy percent went into what the trade calls wet corn milling—that is, cornstarch, corn sirup, dextrose, and corn oil, mostly. The rest goes into cornmeal, corn flour, hominy grits, breakfast foods, and alcoholic beverages.

The uses for cornstarch and corn sirup are sometimes surprising. Starch is used in glues, charcoal briquets, fireworks, paints, plywood, cardboard boxes, printing, and rubber tires—to name a few uses along the industrial line.

Corn sirup goes into baby foods, coffee whiteners, jams, soft drinks, licorice, canned sweet potatoes and scores of other products.

Obviously, the influence of John Miller's corn extends far beyond his farm.

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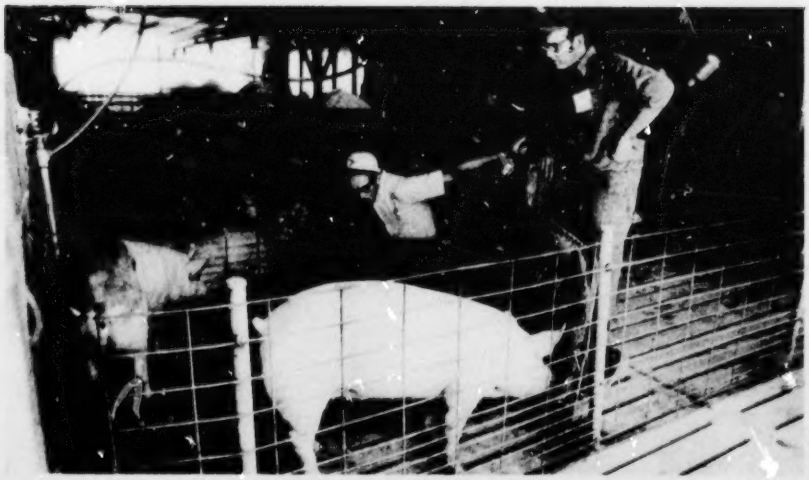


"Eyeballing" gilts as prospective sows in future breeding programs, John Miller is assisted by a friend and manager of a nearby hog farm, Larry Green, who found these two "acceptable—better than average." Green said they had a little more backfat than "a real fancy gilt" but that their hams were "real acceptable." Also important are the number of teats, length of body, soundness of legs and general disposition.

ABOUT BREEDING

As John feeds the young hogs—after they've been weaned and have gained more than 40 pounds—he starts looking them over—"eyeballing them," he calls it—to pick out the female pigs that he'd like as mothers of his future pigs.

When these young gilts—as they are called—weigh about 175 pounds, John picks out 30 to 50 candidates for motherhood from the finishing pens—the place of their last confinement before marketing. He changes their diet since there is no hurry, now, to finish them to market weight. His eye tells him these females have the characteristics he wants in a sow. As he continues to watch them and before they are bred, John will reduce their numbers to about 25.

What is John looking for as he "eyeballs" the gilts?

Well, for one thing, he wants his hogs to have strong legs. A good sow needs them, because inactive or clumsy sows don't raise good litters. Pigs need strong legs because they will live most of their lives on slats.

That's right—slats—a floor made of narrow wooden (or concrete or plastic) strips spaced an inch apart. John's pigs are farrowed on concrete and bedded down in sawdust until they are weaned at 3 to 5 weeks of age. Then they spend the rest of their 6-month lives confined in pens, on slats.

John has remodeled an old hay barn as a place to feed his hogs. The animals live in pens with metal fences and slatted floors, above a pit, called a lagoon which catches their manure and urine as they fall down between the slats. With such a system, John has eliminated the need to clean the pens of manure.

Periodically, this pit is drained into a vacuum tank wagon that looks like a gasoline truck and the liquid, rich in plant nutrients, is taken to corn fields and spread on the ground.

Many of America's hog farmers use a system like that. Some don't. Some let their pigs run free in pastures—where the grass benefits directly from the manure (as the pigs benefit directly from the grass).

John once raised his hogs on pasture. Now that land is planted to corn. John now keeps his hogs penned up for several reasons.

He switched primarily because he could afford it. Besides, his pasture equipment was wearing out.

In addition, John found his animals grew faster in a controlled environment, especially in cold months, and the pasture system required much more labor.

So John Miller's hogs grow up and are finished (fed) to market weight while confined in a barn, on slats. And the hogs need strong legs.

What else do the prospective sows need?

John likes his future sows to have an ample number of teats—enough so they can feed a good-sized family successfully. The sows ought to have large deep hams (that's what will bring more money at the packing plant when John sells her offspring), a strong back (indicating good loin development and ability to carry a litter well), and other appearances which help to assure that her offspring will bring the best prices at the packing house. A heavy jowl (cheek) means excess fat. Too narrow a body means a smaller loin and smaller pork chops.

If John's hogs are too fat, and they don't produce a higher percentage of the better cuts of pork, he's wasting his feed. He can't afford to waste feed.

BOARS ARE EVEN MORE IMPORTANT

To increase his chances of producing more valuable hogs, John works hard at applying the laws of genetics. If the gilts seem promising, and they are mated with scientifically observed and measured boars, or such boars' close relatives, John is improving the odds in his favor.

Scientists and hog breeders in the United States have been going all out since the 1950's to find the genetic path to leaner, meatier hogs so that customers can buy leaner bacon, meatier pork chops, and other choice cuts they indicate they want.

There are 40 testing stations in 27 States for young boars, where animals with superior genetic qualities are determined scientifically. These young boars are used in breeding herds to pass on their superior qualities to their offspring.

In these testing stations, operated commercially or by groups such as cooperatives or by State universities, scientists usually test the daily rate of gain of the boars (the national average for hogs is 1.5 pounds a day); their feed efficiency (on average, about 350 pounds of feed are needed to produce 100 pounds of weight gain); backfat thickness (usually 1 to 1½ inches); their "pork chop potential" based on the loin eye produced in a littermate which has already been slaughtered (hopefully 5 or 6 square inches in the loin eye), and other characteristics, such as the number of days it took the boars to reach 220 pounds in weight.

What's a loin eye? It's the meaty part of the pork chop. The bigger the eye, the meatier the chop and the more the farmer may be paid for it.

"Over the years hogs have changed a lot," John reminisced as he repaired a water line in the finishing barn. "I started with hogs with 3.5 square inches of loin eye. Now the loin eyes are 5-6 square inches. Hog backfat has been reduced from 2 inches down to 1.1 inches."

John keeps up with the results of the Iowa Swine Testing Station and others. If he doesn't buy a boar directly through the station, he likes to visit the farm where the test animal was born and buy a close relative of that animal at a reasonable price.

Boars are important to the overall quality of John's herd. Each will mate with several gilts or sows, so the boar's hereditary characteristics will be shared by many offspring. A set of good characteristics could mean extra dollars for John when the offspring are sold.

People have paid as much as $40,000 for an extremely high quality boar.

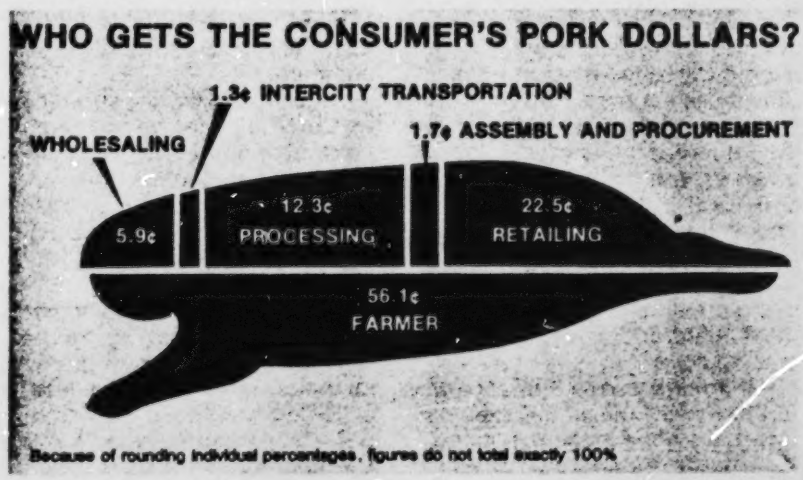
MANY FARMERS BUY FEEDER PIGS

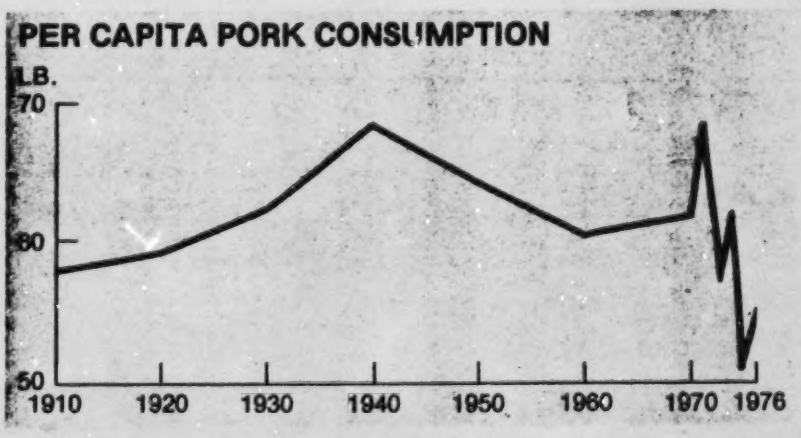
Of course, if a grower wants to avoid all the concern about buying the best boar he can afford and selecting the best gilts, he can always buy young pigs from someone else and feed them to market weight. He also will save all the trouble connected with farrowing and breeding.

More and more farmers are doing just that. About 40 percent of all hogs slaughtered are produced on farms other than the ones where they were born.

Under this system, the producer buys the young pig when it has been weaned and weighs about 40 pounds. He feeds it until it reaches market weight, about 220 pounds.

A lot of farmers are in business just to produce feeder pigs—an example of modern day specialization on the farm.





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Whether the Iowa farmer produces his own pigs or buys young pigs from others, his favorite feed for those pigs is corn. It's been that way for more than a hundred years—since the hogs "came out of the woods," so to speak.

In the early days of hog production in the United States, in the 18th and early 19th centuries, hogs ran free in the woods and the pastures to find their own food. They were good scavengers. For practically no investment in time, labor or money, the pioneer farmer could sell hogs for cash . . . cash he needed to buy food he didn't grow himself, some cloth for clothes, and the tools of production that were manufactured in the cities.

Such early hogs were pretty "rangy"—that is, they were lean but also stringy and tough. Some people called them razorbacks. Still, these hogs were all you could buy at the time.

If you were the farmer, however, you could put some corn aside to fatten up the hog intended for your own table—after the hog ran free in the woods for a few months. A hog could provide not only some meat but lard for cooking and for making soap.

As farmers moved farther and farther "west" (Ohio, Illinois, Iowa), they began to grow more corn than they could sell for human consumption (including corn meal, grits, and whiskey). They started feeding more corn to more hogs. Fortunately, transportation facilities—rivers and canals at first, then railroads—were established in time to handle the marketing of the hogs. The animals could be shipped from the farm to the slaughter house and from there to the consumer in the city.

Hogs are grown all over the country. Corn is grown all over the country. But most corn and most hogs are grown in the Corn Belt—in all or parts of the States of Iowa, Illinois, Indiana, Ohio, Minnesota, Missouri, Nebraska, and South Dakota. States in the Southeast and Texas are important hog producers, too.

Corn grows so well in the Corn Belt and hogs grow so well on corn, the two just naturally grow together.

Why does corn grow so well in the Corn Belt? It's the soil and the climate primarily.

The soils are highly fertile—relatively high in organic matter and nitrogen. They are medium to fine in texture and hold moisture well.

Much of the land is either level or gently rolling, making it easy to get around with farming equipment, and the land is less subject to severe water erosion that would wash away the fertile topsoils.

HOGS HAVE BEEN "MORTGAGE LIFTERS"

For years, hogs bore a reputation of being "mortgage lifters." That means they could usually be counted on to bring in cash to pay off the mortgage payments on the farm.

John Miller says "hogs don't always carry the prestige of cattle, but you can't live on prestige."

Hogs are more prolific than any other form of livestock (cows almost invariably bear only one calf per birth), they grow to a salable size rather quickly, they produce litters twice a year, and they increase the value of corn.

HOG COUNT STEADY, FARMS DECLINE

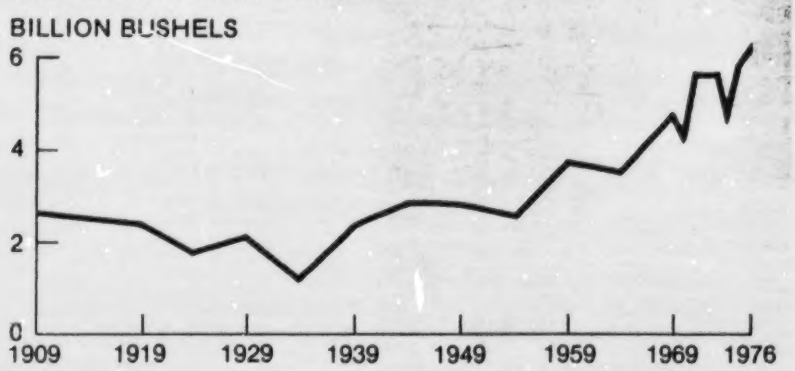
The number of hogs on U.S. farms hasn't changed much since 1890, when the census takers counted 57½ million swine on U.S. farms. In 1977, there were 55 million hogs and pigs on our farms.

Yet the number of farms raising hogs has dwindled with time, just as the overall number of farms has been dropping for decades in the United States.

In 1900, some 4 1/3 million farms were raising hogs in this country. The number increased to 4.8 million in 1920, but then the numbers started dropping.

By 1959, the number of U.S. farms raising hogs dropped below 2 million. Just 10 years later, the number was 686,097.

U.S. CORN HARVESTED FOR GRAIN



CORN BELT IS "JUST RIGHT"

The Corn Belt is perfectly located between the Equator and the North Pole, near 40 degrees north latitude, and so provides time for corn and other feed crops to mature. The last frost of spring and the first frost of fall are far enough apart so that seed can be planted late in April or

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When he isn't chisel plowing for next year's crop, Scott Kleckner, a student at the nearby University of Northern Iowa, unloads golden kernels of corn harvested by the combine in the background. This is a rewarding time on the farm—when tons of corn are augered up into a dryer and then stored either for feed or for sale. Scott knows how to handle many kinds of farm equipment on the Miller farm because he grew up on a farm.

early in May and the crop can be harvested in mid-fall—just the correct length of time.

The Corn Belt's rainfall is just about right, not only in terms of inches per year, but in terms of *when* it rains.

Timing is critical in growing corn. Corn, which is a kind of grass that opens out of the ground like a telescope, requires a great deal of water when it's growing—about 300 to 500 pounds of water for every one pound of dry material that forms in the plant.

In Iowa, where more corn is grown than in any other state, most of the rain falls during the 4 most critical months: May through August.

Yet, even within those 4 months, timing is important.

The seed, planted late in April or early May in the Corn Belt, needs some beginning moisture—enough to soften the covering of the kernel and to release the food stored in the kernel to the embryo plant within the seed. But if there has been too much rain, and the soil is poorly drained, the young plant will not get the oxygen it needs to produce energy and grow.

Also, a wet spring encourages roots to grow too close to the surface—which is disastrous in a drier-than-usual summer. Roots can find water only at deeper levels in a dry summer.

John tries to have all his crop in the ground by May 1, but weather and soil conditions can delay him.

There's a saying in John's part of Iowa that every day's delay beyond May 10 reduces corn yields one bushel per acre. The reasons: pollination is delayed into hot unfavorable weather; or the ears won't mature enough before the first frost.

Though John plants his corn in early spring, he starts preparing the ground for seed in the fall, soon after the previous harvest.

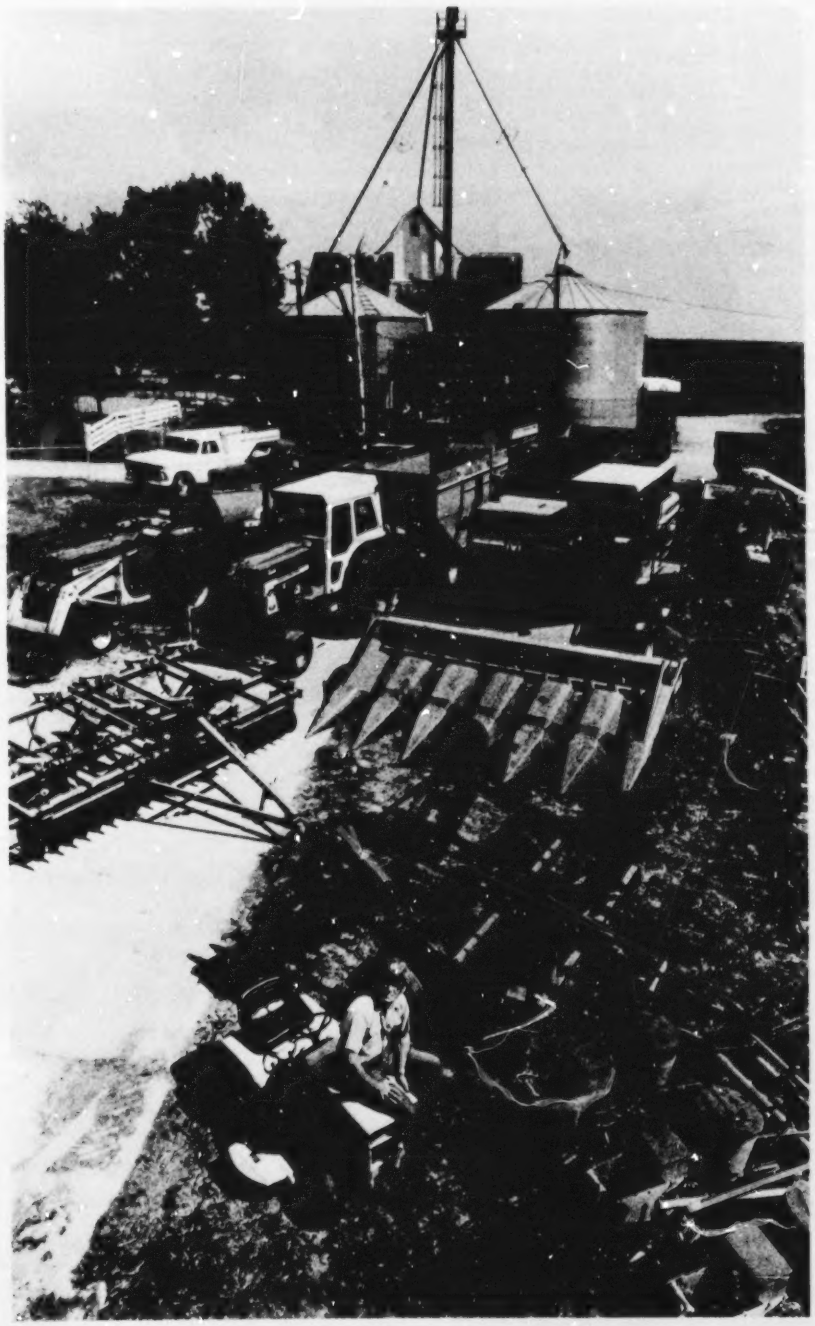
First he spreads phosphate and potash fertilizer on the soil, in amounts just right for his particular types of soil.

Phosphorous compounds are like the wiring in a house, permitting the transfer of biochemical energy from one life process to another in the plant cell. Potash provides potassium, but scientists aren't sure what role potassium plays in the plant life, though it is necessary. Some say it activates enzymes, speeding up biochemical reactions in the plant.

After he has spread the fertilizer, John chisel plows his acreage on the contour (following the natural curves in a slope rather than up and down the slope).

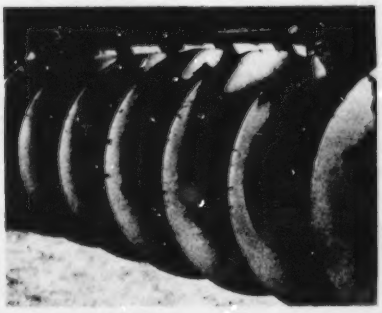
To better explain the mechanics of his soil preparation, John walked among the pieces of machinery—worth thousands of dollars—and pointed to the soil-working parts of each, explaining their functions in simplified terms.

Imagine holding nails between your fingers and dragging them through soil. You'd be cutting open the soil much the way John does with the big chisel plow that he pulls behind his tractor. The idea is to stir up the soil to a



John Miller is backed by many thousands of dollars worth of equipment on his corn and hog farm in Iowa. Almost all of that shown is field equipment needed to grow corn. However, the light-colored pickup in rear, left, is used to haul hogs to market. Cylindrical tank in front of the pickups is used to haul liquid manure to the fields from the finishing barn (atop which the photographer is perched). The big combine with the six-row corn harvester head is in the center, with initials on the air-conditioned cab. Behind Miller are the chisel plow and disk used to till the soil. In front of him is the planter. Behind the equipment are the grain storage bins. As a farmer acquires more and larger such bins, the tower which supports pipes leading to the tops of the bins—called the leg—grows taller.

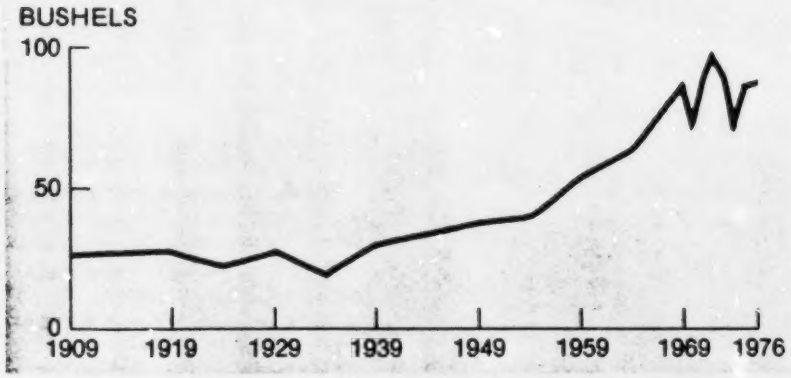
Teeth of chisel plow used in fall tillage.



Cutting edges of tandem disk used in spring tillage

Corn planter's sharp wheel-like colter, right, cuts soil; seed drops from box behind it, and hand-like metal strips fold soil back over the seed. Rubber tire, left, presses soil down gently over seed.

U.S. CORN YIELD PER HARVESTED ACRE



depth of 6 to 10 inches, but doing it in narrow strips so the corn stalks and other vegetation left over from the corn harvest will remain on top of the soil all winter to help keep the soil in place and to keep moisture from evaporating so fast.

The 4-inch-wide points of John's chisel plow, spaced 15 inches apart, are twisted slightly so that soil is brought up and partially covers the crop residue.

His contour plowing helps keep soil from washing downhill.

John observes that "continuous up-and-down-hill tillage on our types of soil would result in 14 to 16 tons of soil loss per acre per year. We try to hold losses to 5 tons or less." Five tons sounds like a lot, but John explained that this represented the loss of 1/35 of an inch per acre. He holds losses on some fields down to 2 or 3 tons a year.

NITROGEN IS IMPORTANT

After chiseling on the contour, John knifes in some anhydrous ammonia. Again, imagine dragging nails through the soil, much the way John drags metal fingers behind a tractor. Attached to these fingers or knives are tubes which allow anhydrous ammonia gas to escape into the soil opening made by the knives. The gas attaches itself to moist soil particles.

Anhydrous ammonia provides nitrogen for the growing corn. Every plant cell needs nitrogen. Even chlorophyll, which enables plants to convert carbon dioxide and water into sugars, starches and fats, is a compound of nitrogen.

While the suburbanite applies nitrogen to get a green and healthy lawn, the farmer applies nitrogen to increase the yield of corn. He applies nitrogen in amounts that are indicated by tests and analyses.

U.S. corn yields have more than doubled since 1950, due in great part to the increased use of relatively inexpensive nitrogen fertilizer.

America's phenomenal corn production (American farmers grow nearly half the corn grown in the world) has also been aided by the development of vigorous hybrid corn varieties. Today's corn looks no more like the maize that the Indian planted than today's horses look like their miniature forebears of prehistoric times.

It is estimated that hybrid corn varieties developed by scientists and farmers have been responsible for half the increase in corn yields which have nearly tripled in the United States since hybrid corn varieties were first introduced commercially in the 1930's. The rest of the increase is attributed to the increased use of fertilizer and improved methods of working with the soil.

Not only does today's corn provide more bushels per acre, but it offers the farmer a number of varieties to fit his conditions. Each hybrid responds differently to the weather, diseases, and other growing conditions.

If continuing rain delays John Miller's corn planting until late in May, he selects a quicker-maturing hybrid which will mature before frost comes in the fall.

In any given year, John Miller may plant as many as seven different varieties of corn—primarily to ensure that a problem which affects one kind won't affect the whole crop. A total crop wipe-out could put him so far behind financially he might never recover.

John plants hybrids with such names as Pioneer 3780, Dekalb 64a, and Funks 4321, which tell their brand and variety number. Their maturing periods vary from 95 days to 110 days.

He likes to start planting April 23 to 25 and plant 50 to 80 acres a day until completion.

Farmers elsewhere plant at different times depending on the temperature and moisture condition of the soil. The soil must be warm enough for the seed to germinate and not so clogged with water that the seed will "drown"—die for lack of oxygen.

Since John partially prepared his soil in the fall, his first step in the spring is to cut up the surface of the fields with a disk, a machine that looks like a row of sharp-edged metal pie plates set on edge. John rolls the disks over the ground at a shallow depth, providing a bed of fine soil for the seed.

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Plowing on the contour means cutting the soil open perpendicular to the line that water would follow draining off a field. This reduces loss of valuable topsoil during heavy rains. Corn stalks left by this fall tillage operation also will retard flow off of both soil and water.

JOHN REDUCES TILLAGE

Farmers used to make several trips over the fields with implements, cutting the soil into fine pieces several inches deep. Now people think that wasted time, fuel, and the soil itself. Too much tillage can break down the structure of the soil and inhibit its water-holding capacity and ability to support plant growth.

Now farmers make fewer trips. This is called "minimum tillage," which was used on 39 million acres of U.S. farmland in 1976, compared with only 3.8 million acres in 1963.

Farmers who continue to use the old methods are what John calls "1940's farmers." Such farmers, in turn, call John a "trash farmer," because his fields look trashy between crops—the stalks, grasses and weeds that are left after harvesting remain in the fields between crops, indeed, even after seeding.

John's corn planting machine drops kernels into rows in the prepared soil, then presses soil around each kernel so it can germinate (it needs to be next to the moisture found between the tiny soil particles).

Each kernel of seed corn contains the germ of a new plant and enough food to keep it going until the earliest leaves break through the soil. When the leaves unfurl in the sunlight, the plant will begin to manufacture its own food.

Attachments to the corn planting machine also apply a liquid herbicide (weed killer) and granular insecticide (insect killer) in precise amounts per acre—usually fractions of a pound. John explained that careful calibration of the equipment is essential so that he doesn't use more chemical than he needs.

The herbicide kills weeds that might compete with the corn for water, food, and sunlight. Like many things on the farm, however, the herbicides don't always work out as planned.

"We are playing a percentage game." John explained, "Four out of 5 years we hope to stop at least 80 percent of the weeds. Soil conditions, weather patterns, choice of chemical, and timing are crucial.

"Matching herbicides and insecticides to your own particular weed and insect problems is vital. There are hundreds of chemicals and chemical combinations available."

The weeds that John tries to kill with herbicides sound like monsters in a suburban lawn lover's nightmare: foxtail, butterprint, cocklebur, fall panicum, smartweed, ragweed, thistles, lambs-quarters, and quackgrass.

The first insecticide application is aimed at killing the bugs that like to munch on corn roots. Later arriving insects may require other insecticides to discourage them from eating the leaves, the stalks, and the kernels of the corn plant.

Typical of the insects that John might fight in order to win the right to harvest the grain are the cutworm, which cuts the plant off at ground level; any of three kinds of corn rootworm, which prune corn roots; and the corn borer, which burrows into the stalk or ear shank.

If it doesn't rain within a few days after the herbicide is applied, John goes over the fields with a rotary hoe so that the herbicide can work its way down to the germinating weed seeds and knock them out. This operation helps knock out any weeds that have already started. The rotary hoe is a group of star-shaped metal disks which cuts up the ground to just below the

surface, between the rows of corn plants.

Later, even though he has used a herbicide, John goes back through the fields of growing corn with a cultivator, which cuts and uproots any weeds that might have sprung up between the rows of corn. Cultivation also loosens the soil so that it retains moisture that falls. Cultivating can also reactivate some herbicide by bringing it to the same level as the weed seeds.

Cultivators come in all shapes and sizes, some resembling several curved knives in a row or sharp disks in a row.

There is a limit to how late in the season John will cultivate. He doesn't want to cut off valuable corn roots which have been growing toward the center of the rows. When the corn plants have grown tall and full, they will cut off sunshine from competing weeds (which need sunlight, too).

John's dependence on good weather is total, and that dependence takes many shapes. When a corn plant is tasseling (that familiar tassel that shoots out of the top of the plant and contains pollen), the plant likes balmy weather with a little breeze. Why? So the pollen from the tassel will blow gently around the fields of corn and fertilize the silken strings that emerge from the ears. Each silk leads to a potential kernel of corn (the ovary).

John likes some rain and cool weather (less than 85° F) at pollination time, about 70 to 80 days after planting. Dashing rains, on the other hand, will drive the pollen to the ground. Hot, dry, windy days put the corn under stress and cause poor pollination. Fewer kernels develop. In 1974, for instance, extreme heat in the Corn Belt during late June and the first 3 weeks of July caused extensive barrenness (lack of ear development). About 1 week of extreme heat and dryness in this period can cut yields significantly.

WHERE IN THE WORLD?

U.S. farmers grow nearly half (47%) of all the corn grown in the world. We ship about a fourth of our production overseas.

People overseas want our corn to feed to livestock and poultry. The European Community, usually our top corn customer, buys 10 to 12 million metric tons a year. Japan, another steady customer bought 5.8 million metric tons in 1976, and the Soviet Union, our leading customer in 1976, bought 10.3 million metric tons.

Other notable producers of corn are China, which harvests about 11 percent of the world's production, Brazil, 5 percent, the Soviet Union and South Africa 4 percent each, and, in lesser percentages, Mexico, France, Argentina, Yugoslavia and Rumania.

Most of the corn production of those countries stays at home—as, indeed, it does in the United States. Even so, the United States accounts for more than 70 percent of the corn that is exported in the world. In fact, U.S. corn exports account for about one-fourth of world trade in *all* grain—including wheat and coarse grains.

U.S. corn export shipments were valued at almost $5 billion in fiscal 1976.

It was the third successive year in which the U.S. exported more bushels of corn than wheat.

CHINA LEADS WORLD IN HOGS

About 35 percent of the hogs in the world are in China. The U.S. Department of Agriculture estimated there were 237,250,000 of the animals in mainland China in 1975.

That's four times as many as were in the United States, the world's second largest producer.

Brazil was third with 35½ million hogs.

"YOU CAN HEAR CORN GROWING"

Corn likes moderately warm days and warm nights when it's growing fastest in June and July. Some folks claim they can hear the corn growing on hot humid nights in the Corn Belt. (Well, a field of corn does make a lot of rustling noises on such a night—with a little wind in the air.)

Yet corn growth slows when temperatures are over 85° F and stops by 90° F.

Average temperatures in the Corn Belt are 76° F in July and 74° F in August. The ideal is a range of not less than 50° F at night and not more than 86° F in the daytime.

The highest yields of corn have occurred in summers when June was warmer than usual but with lower than normal temperatures in July and August.

Climate dictates to a great extent where corn can be grown in the world. But there are other factors.

America is fortunate in having a large area with just the right conditions. Most countries are not so fortunate.

Draw a line through the areas of the Northern Hemisphere where the mean (midway between high and low) temperatures in July are 70° F to 80° F. (just right for corn). Along that line you'll find other conditions that discourage the growing of corn—either the soil isn't good for growing corn or the rainfall is too skimpy or the rain falls at the wrong time of the year.

There are similar problems in the Southern Hemisphere—though the growing season falls in opposite months.

Consequently, farmers in the United States produce 47 percent of the world's corn, most of it in the Corn Belt. Two States in the Corn Belt, Iowa and Illinois, produce 40 percent of the corn grown in the United States. Those two States in 1974 produced the equivalent of the

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corn production of all of Eastern and Western Europe combined.

The Corn Belt is a great place, too, to raise soybeans, wheat, potatoes, and several other crops. Indeed many soybeans are grown there to make soybean meal, a protein supplement which is fed to beef cattle and hogs.

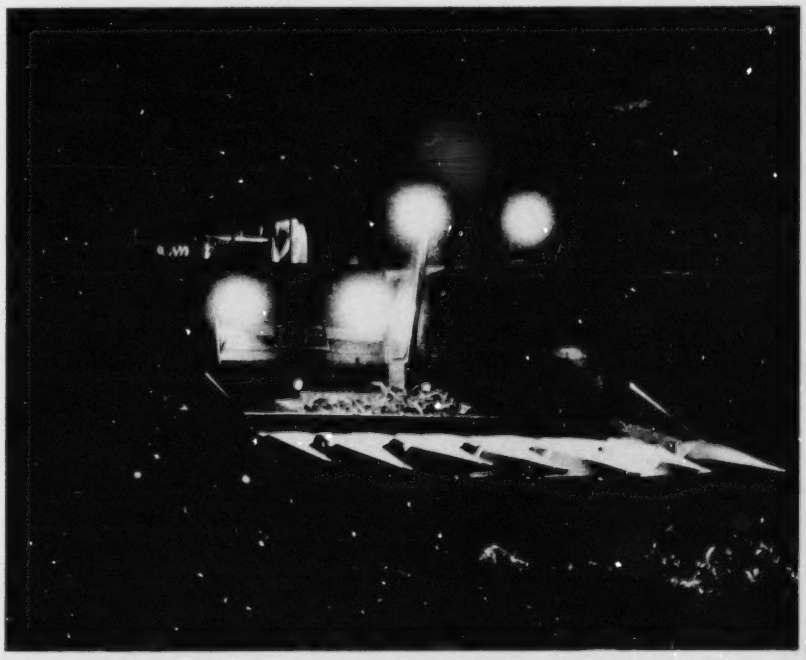
Farmers grow corn and soybeans in the Corn Belt rather than wheat and other crops because they can make more money per acre with corn and soybeans. Wheat can be grown in other places—such as west of the Corn Belt in the United States—where wheat's adaptability to drier conditions enables it to be grown more successfully than other crops.

Corn is mature when the ears have produced all the kernels that their genes, the soil, and the weather—in coordination with the farmer's efforts—have permitted that year. The kernels have stopped filling, their tops have dented inward, and drying has begun, a condition necessary for good storage. Ideally, this all happens before the first killing frost.

In the Corn Belt this is probably in early October. The stalks and husks of the corn turn brown. The leaves on the colorful maple, oak, and other hardwood trees turn their brightest colors.

Above:
Terracing of farm land means moving tons of dirt around so that the earth is shaped into a descending series of nearly flat "table tops" of land. Conservation-minded farmers such as the Millers install them to reduce runoff of valuable soil during rains. Big earth-moving machines replace plows in doing such work on many modern farms.

Below:
When corn harvesting starts in the fall, the machines keep going for 14 or 15 hours a day. Often, meals are eaten in the fields. Powerful lights cut the darkness to guide the operator. Even when the harvester's motor finally stops at night, the roar of the gas and fans drying the day's harvest in the barnyard helps lull tired operators to sleep.



ROLL OUT THE COMBINES

It is then that John and the other farmers wheel out their gigantic, modern, glass-enclosed, expensive, radio-equipped and often air-conditioned combines. The dusty continuous work of modern corn harvesting begins.

A combine is a machine that can either cut and thresh soybeans and small grains, or harvest and shell corn. John's combine cost him $44,000.

CORN COSTS BREAKDOWN

John Miller says he has to sell his corn for $2.32 a bushel in order to stay even. He figures that $2.32 is what it costs him to produce corn—$290 an acre on land with a yield of 125 bushels to the acre. Here's his breakdown of costs per acre:

Insecticides and herbicides	$ 24	
Fertilizer	46	
Ownership and operation of machinery	70	
Labor	20	
Seed	13	
Rental value of the land	117	(6½% interest on $1800 per acre land)
TOTAL	$290	

Nationally, the average yield runs about 87 bushels to the acre. If John's yield were that low, he'd have to sell corn at $3.33 a bushel to break even. The cost of producing corn varies widely across the United States—depending on how you farm, how you value your land, and how you value your labor and management.

Iowa State University estimates that the cost of producing corn in Iowa in April 1976 averaged $227.43 an acre; that was assuming a land rental value of $85 an acre. With a yield of 110 bushels to the acre, a farmer needed $2.07 a bushel to break even.

The Economic Research Service of the U.S. Department of Agriculture estimated that farmers in the Great Lakes States and the Corn Belt had an average cost of $127.70 an acre growing corn in 1975—without adding in the cost of the land or the value of management. Add John's $117 land value to the $127.70, and the cost is $244.70 an acre.

The University of Illinois estimated that the average cost per tillable acre to grow corn in central Illinois in 1975 was $254—on farms with no livestock.

To use the combine for soybeans and small grains, such as wheat and barley, or for corn, you just change the harvesting front ends—or heads—as you might on an electric razor (though not quite so quickly). The small-grain head is a broad revolving set of bars that rotates like a short, wide ferris wheel gathering the grain and pushing it against a cutting bar in front of the combine's cab.

The combine head for harvesting corn (the corn head or picker) looks like the metal fingers of a huge tin man; they run open-fisted through the rows of corn—one row between each two fingers. At the base of the fingers, the machine strips the stalks and pinches off the ears. The combine carries the husk-covered ears up the inclined fingers for further processing, leaving most of the stalk in the field.

"Further processing" means the ear of corn is husked and shelled. The machine removes the outer protective covering from the ears and shells the kernels from the cobs. The combine blows the husks and cobs out the rear of the machine, and elevates the kernels to a storage bin on the machine until they are unloaded and taken to stationary bins near the Miller house.

The kernels are dried, if necessary, back at the farmstead.

Why dry the corn? Dryness helps prevent spoilage in storage. (Another way to prevent spoilage is to treat the corn with a spoilage-inhibiting acid before storage; this treatment is used for corn that will be fed on the farm.)

Moisture content makes a difference in the payment a farmer gets for his corn at the local elevator. If his corn contains 16 percent moisture, the farmer is paid less than for corn with 15.5 percent moisture. The payment is lower because the elevator owner has to spend some money drying the higher-moisture corn so he can store it and ship it under the right conditions.

The farmer exercises his judgment on whether to dry the corn himself. As the corn is dried, it loses some of its weight. So while the farmer may be paid more for the drier corn, he sells less weight. He must decide which moisture content will bring him the most money, after considering the drying costs.

Many farmers dry corn by burning liquified petroleum gas, though John and some of his neighbors use natural gas to heat the air blown through the corn. Several experiments in drying grain with solar energy are already underway. When the air is dry enough, you can dry corn just by blowing natural air through the corn.

John has storage capacity for 34,000 bushels of corn. He needs 10,000 bushels a year to feed his hogs. Because he hopes to harvest 48,000 bushels each year, he must arrange to sell and deliver 14,000 bushels immediately after harvest or arrange to store the corn in town. He puts the remaining 24,000 bushels in storage on the farm to sell later when, he hopes, the prices will be better.

HOGS CAN RAISE VALUE OF CORN

One reason John raises hogs—instead of just selling the corn—is to increase the value of the corn to more than the grain will bring in the market.

Here's the reasoning:

Say it costs John $67 to raise a hog to market weight (not counting the cost of producing or buying the young pig), and he sells it for a profit of $15—after deducting the costs of

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production, including the corn fed to the hog. Under some conditions, he could say that $10 of that profit represents the increased value he received for feeding the corn to the hog instead of selling the corn directly. The other $5 might represent what he pays himself for labor and management.

Perhaps a more pressing reason for raising hogs is that John would have spare time on his hands if all he did was raise corn. He has too much money invested in land and buildings to let either himself or his investment stand idle, when both can be earning more money for the family.

Growing corn takes only a few months of John's time. As long as he can make money raising hogs with that extra time—why not raise them? It spreads his financial risk over two enterprises.

It takes a lot of money to grow corn and hogs. It cost John and Mary $163,652 to conduct their farming operation in 1975. That included $38,959 in payment on their debts, $21,250 in new machinery, $19,394 to rent farmland, $18,358 in fertilizer and lime, and many other expenses.

Beyond those cash expenditures, the Millers have a big investment in machinery and buildings. The list of machinery and buildings fills 3½ pages of computer printout paper.

Back in his kitchen and running through his list of machinery, John figured the machinery's value at $112,000. That's today's replacement value minus depreciation, rather than his original cost minus depreciation.

The depreciated value of his buildings is $75,000, counting original costs and major improvements but not taking replacement costs into account.

The Millers estimate that they are making a return of 6.5 percent on the capital that he manages.

JOHN AND MARY'S INCOME AND EXPENDITURES, 1975

Income	
Crop sales	$109,326
Hog sales	66,820
Machine hire	794
Government payments	150
Miscellaneous	1,406
Total	$178,496

INCOME	$178,496
EXPENDITURES	163,652
	$ 14,844

Expenditures	
Labor	$ 3,655
Building Repairs	1,475
Machinery Repairs	5,042
Interest	8,500
Feed (not including corn)	16,148
Seeds	4,875
Herbicides & Insecticides	7,243
Fertilizer & Lime	18,358
Machine hire	3,926
Livestock expenses	1,102
Fuel	2,625
Property Taxes	1,520
Insurance	2,887
Utilities	1,931
Auto & Truck	1,294
Rent	19,394
Livestock Purchased	1,190
Machinery Purchases	21,250
Building & Equipment Purchases	1,475
Principal Payments on notes	38,959
Miscellaneous	803
Total	$163,652

During 1975 the value of assets (net worth) owned increased by $29,418 due to reinvestment in the business and debt payment. By January 1, 1977, the value of assets decreased $10,000 on the same number of hogs—because of lower prices—and $24,000 on the grain—both because of lower prices and reduced yields caused by drought.

CONTINUING COMMITMENTS

Farming has demanded a series of commitments from John and Mary Miller, willing commitments of their money and their lives, starting in 1960.

John and Mary met at college in the fifties, at a school with a reputation for graduating well-prepared prospective teachers—the University of Northern Iowa, in nearby Cedar Falls. They were married the year they graduated, 1959, and started teaching that fall, John, in general science and Mary, in music.

A year later, they moved in the tenant house on his father's farm.

Their reasons were compelling: John's father farm had been rented for 8 years while his father served in the State legislature; John's father was suffering from heart trouble; and John liked working outside.

The move had a familiar ring. John's father had moved back to the same family farm in the thirties after 9 years of teaching.

"Both my father and I were only sons," John explained, sifting through old newspaper clippings. "I suppose we felt that

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Mary Miller doesn't work in the fields but plays an important role in the farm operation handling telephone calls, taking meals to the field and coordinating family activities to meet the farming schedule. She also keeps busy, like most suburban housewives, driving three children to various activities, and keeping up the house. Unlike most, she also teaches 21 young people, such as David Nichols, right, how to play a piano in her family room. Of course, if John has his hands full in the field, as below, Mary is available to drive into town for a needed part. She'd like to travel more but has been to neighboring States and as far west as Yellowstone National Park on vacations.

the responsibility of the farm would be ours someday, so why not take it over now, while there is a chance to keep it in shape?"

So John began farming with his dad in 1960.

In 1966, John's parents moved into Cedar Falls. The next year, John and Mary made their next important commitment.

"We were two families living off 240 tillable acres," John continued. "We had a beef cow herd and fed out their calves. We farrowed hogs twice year. We made lots of hay and kept a lot of acres in pasture. Using a crop rotation, we usually planted 60 to 80 acres to corn.

"I could see that we weren't making much progress in general farming. We talked about going back to school, perhaps working the farm part time while teaching full time."

The Millers, however, decided to stay on the farm. But only with drastic revisions.

They got rid of all the beef cows. By converting buildings and pulling fences, they converted to growing hogs and planting all row crops (crops grown in a row, such as corn and soybeans), rather than keeping the pasture.

They consulted experts—management and agronomy specialists with the Cooperative Extension Service of Iowa State University and soil and conservation experts with the Soil Conservation Service (SCS) of the U.S. Department of Agriculture.

GOOD FACTS HELPED DECISIONMAKING

From an SCS survey of the various soils in Black Hawk County, John learned the different soil types on the land he was working, the exact location of those soils, their limitations, and their potentials.

For instance, he learned he had a lot of No. 377B (Dinsdale silty clay loam), and that it had a corn suitability rating (CSR) of 90 out of a possible 100. This land could be expected to produce 119 bushels of corn to the acre. Another good soil available to him was No. 184 (Klinger silty clay loam) with a CSR of 95. He could expect 125 bushels to the acre from this land.

On the other hand, there were a couple of patches of 782 (Donnan loam) among the better soils, and its CSR was only 50. This land would probably yield only 70 bushels to the acre.

These and other facts led John to a conservation plan for their farm.

"Planting row crops without strict conservation methods is like taking money from the bank

Pork products, such as sausage and chops, are an important part of the Miller family diet, of course. And the hogs that provide it come from their farm. But unlike "the good old days," the animal is processed in town. The Millers have two freezers which they fill not only with pork but beans, brocolli, sweet peppers, sweet corn and tomatoes grown in their garden and either canned or frozen by Mary during August and September. The green beans, brocolli, sweet corn and tomatoes last all year. Freezer doors, Mary shows, above, serve as bulletin boards, too.

It's natural that Mary Miller's children should play musical instruments. Julie not only takes flute lessons at a nearby university but plays piano in her high school's jazz band.

without ever putting anything back in," John said, as he brought out maps that locate the conservation projects on the farm. "Someday, sooner rather than later, you're going to go broke—not only in terms of money; the land will also be bankrupt."

Armed with a conservation plan, John took out the fences so machinery could operate more efficiently over larger fields and along the natural contours of the land. Then he plowed to change the face of the land on his father's farm.

"I plowed and I plowed," John recalled (even the memory of it seemed to tire him). Repeated plowing trips across the land piled the soil into terraces that follow the natural contours of the land, providing steps of descending plateaus that slow the runoff of water and rich topsoil.

A lot of earth has to be moved around to build terraces. If a farmer can afford it, he hires big earth-moving machines to come in and rearrange the land. That first time, John chose to do it himself with plows. In 1976, he could afford to have it done with large earth movers.

Terraces are only part of a system that John uses to control the flow of water. By breaking long slopes into shorter, gentler ones, the terraces slow the runoff of rainwater to a "walk off." Some of the water is then absorbed into the soil for later use. Yet heavy rains will still run off John's fields. He has to see that the runoff isn't damaging.

The terraces lead to grass waterways or vertical intake pipes which take away the excess water. The waterways are very shallow; they form rather wide grass troughs along paths of natural waterflow. The thick foliage and massive root structure prevent the accumulated water from cutting into the soil. The pipe intakes take water below ground into a tile network which eventually leads to a road ditch or nearby stream. The waterways, too, empty into nearby streams or marshes or ditches.

DRAINAGE TILE INSTALLED

In the lower areas, John installed thousands of feet of drainage tile to help carry off excess water. Some types of soil need to be drained to be more productive.

There are 90,000 feet (17 miles) of drainage tile ranging from 4 inches to 8 inches in diameter in the land John works. (The

When Brian Miller isn't filling tractors with diesel fuel, or raising hogs in a 4-H club project, or playing baseball or mowing the lawn, he may be found tearing along a dirt lane between maturing corn fields on an all-terrain cycle. That is, when school's out.

average cost of 5-inch tile, installed, is 65 cents a foot.)

In 1968, the Millers made another commitment.

That was the year John bought out his father's interest in the farm's equipment and livestock. Only a few months later, his father died. Since then, John has rented the original farm—268 acres, with buildings—from a trust in his mother's name.

Four years later, the Millers took still another big step.

Gazing out the kitchen window toward the pine trees he had planted as a child, John recalled what he was thinking in 1972 when he bought 160 acres of land in his own name next to his father's farm. The land cost $625 an acre. Two years earlier, the price had been about half that much.

"I was very nervous about paying $625 an acre," John said.

He borrowed $60,000 from an insurance company and $36,000 from the Farmers Home Administration (FmHA) to pay for the land, the tiling of it (to speed the flow of excess water), and some terrace work (to protect the investment).

The rest of the expense he financed by borrowing on short-term loans from local banks.

FmHA is an agency of the U.S. Department of Agriculture which provides loans to thousands of farmers each year. Some of the money is borrowed to buy land, some for operating expenses.

"A lot of things a farmer does, he does on faith alone," John said.

Three years after he paid $625 an acre for his 160 acres, similar land nearby was selling for $1,800 an acre. In 1977, some was selling for more than $3,000 an acre.

The Millers make new commitments continuously. They converted old buildings for use in the new system of raising hogs—in confinement rather than on pasture. They converted a hay barn into a finishing house. They transformed three calf barns into one long farrowing house. They grassed over a holding area for cattle, and they added storage bins.

When John's father and mother moved into Cedar Falls in 1966, John and Mary moved into the parents' old house and started extensive remodeling.

The home was built in 1877 by John's great grandfather, Charles F. Miller, who came from Germany in 1868.

No doubt Charles Miller would recognize the farmhome he built a century ago. Inside, a large modern kitchen, living room and dining room provide a warm environment for the Millers' up-to-date lifestyle. Wings have been added, but the exterior of

This is what the John Miller family looked like in 1976, when John and Mary were 38, Brad was 13, Julie, 15, and Brian, 12. The house was 99 but has been modernized. The family is standing beneath two trees that survived a storm that struck in June that year. John said he saw a dark wall coming toward him across the fields. He ran into a barn and put a vehicle up against the door. Then everything went dark. Julie looked out the kitchen window and saw the power pole behind the house snap and live wires whipping around in the wind. If there had been hail, it could have wiped out the Miller corn crop. Golfball size hail fell that night in Iowa—just a few miles away.

the original house would look familiar.

Furthermore, despite the changes that 100 years have brought, Charles Miller would recognize the motivations, the attitude, perhaps even the style of his great-grandson, John.

Oh, John has substituted tractors for horses and a combine for the handcutting, stacking, and shucking of corn. He taps into a computer to help him analyze his management decisions (that would raise Charles' eyebrow). But the Charles Miller who was 21 when he bought 80 acres and took a chance on farming in a foreign land would recognize the John Miller of the 1970's. He would recognize the spirit of a man who would stick his neck out to buy 160 acres of land and commit his life to making a go of it in 20th century farming, despite the outrageous risks of weather and market prices.

Perhaps most of all, Charles would understand John's satisfaction in making his own decisions and his love of the land.

When John says "People don't own the land, they only have the right to use it; you must leave it in as good a shape as you receive it," he is reflecting an attitude that Charles undoubtedly would recognize, an attitude toward conservation that goes back at least to Biblical times.

It is the land which bridges the gap of years between Charles Miller and his descendant John.

TRADITION IS A LIGHT CHAIN

While family tradition seems to hold the founder's descendants to the land, tradition is not an iron chain. When John's father, Earl, armed with a master's degree in education from the University of Iowa, came back to the farm, it was a big disappointment to Earl's father, John recalled. ("After all, he had an education," they said.)

"Things were entirely different then," John said. "An education was the ticket to escape from hard work. Now, we farmers realize that the more education we get, the better off we are.

"If our kids want to come back to farming after their schooling, why, we'd certainly support that. But whether or not they come back is up to the kids."

Right now Julie is considering nursing as a career. Brad and Brian aren't talking. They're still young.

Meanwhile, the need for further commitments continues.

One of the major decisions facing the Millers now is whether to buy part of the family farm. They are still renting it—

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including their home—from the family trust.

They are weighing the additional taxes they'd have to pay, as well as the sizable principal and interest payments on the loan they'd need to buy the farm. What would those payments and the upkeep do to their cash flow?

As John put it: "Will we be able to generate enough income to service a debt in excess of $200,000, as well as meet family living expenses and the expenses for feed, seed, and fertilizer?"

Perhaps he's already answered his own question.

"A lot of things a farmer does, he does on faith alone."

In his quonset hut-toolshed, where he stores everything that might be recycled some day, John Miller remembers a visitor from a foreign land who said he envied American farmers because all they had to do was push a button and everything gets done. "I don't know how many times I've thought about that as I was shoveling out manure," John said as he worked with lumber from an old portable hog nursery and angle iron from an old windmill to fashion an extension above a trailer to hold more corn.

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